Amendments to the Specification:

Please replace the paragraph beginning at page 4, line 4, with the following amended paragraph:

The penalty function methods are estimation-type identification procedures. They are used to choose the orders for ARMA(p,q)(P,Q) model to minimize a penalty function P(i,j,k,l) among $0 \le i \le I$, $0 \le j \le J$, $0 \le k \le K$, $0 \le l \le L$. There are a [[variety]] variety of penalty functions, including, for example, the most popularly used, AIC (Akaike's information criterion) and BIC (Bayesian information criterion). The penalty function method involves fitting all possible (I+1)(J+1)(K+1)(L+1) models, calculating penalty function for each model, and picking the one with the smallest penalty function value. Values I, J, K and L that are chosen must be sufficiently large to cover the true p, q, P and Q. Even the necessary I=J=3 and K=L=2 produce 144 possible models to fit. This could be a very time consuming procedure, and there is a chance that I, J, K, L values are too low for the true model orders to be covered.

Please replace the paragraph beginning at page 8, line12, with the following amended paragraph:

4. Fit the model, and check for adequacy. If not adequate, [[and]] go back to step 3.

Please replace the paragraph beginning at page 23, line 22, with the following amended paragraph:

The procedure involves first finding a univariate ARIMA model for Y(t) by the univariate ARIMA model building procedure described in FIG. 2. The transformation found by the univariate procedure is applied to all positive series, including the series to forecast and predictors. The ARIMA orders found by the univariate procedure are

used as the initial model for disturbance series. [[An series]] A series of actions are then performed to find the transfer function for each predictor. The details are as follows.

Please replace the paragraph beginning at page 38, line 7, with the following amended paragraph:

A method and computer system is provided for automatically constructing a time series model for the time series to be forecasted. The constructed model can be either a univariate ARIMA model or a multivariate ARIMA model, depending upon whether predictors, interventions or events are inputted in the system along with the series to be forecasted. The method of constructing a univariate ARIMA model comprises the steps of imputing missing values of the time series inputted; finding the proper transformation for positive time series; determining differencing orders; determining non-seasonal AR and MA orders by pattern detection; building an initial model; estimating and modifying the model iteratively. The method of constructing a multivariate ARIMA model comprises the steps of finding a univariate ARIMA model for the time series to be forecasted by the method of constructing [[an univariate]] a univariate model; applying the transformation found in the univariate model to all positive time series including the series to be forecasted and predictors; applying differencing orders found in the univariate model to all time series including the series to be forecasted, predictors, interventions and events; deleting selected predictors and further differencing other predictors; building an initial model wherein its disturbance series follows an ARMA model with AR and MA orders found in the univariate model; estimating and modifying the model iteratively.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A method for determining a univariate ARIMA model of a time series utilizing a computer comprising:

inputting the time series comprised of separate data values into said computer;

inputting the seasonal cycle for the time series into the computer;

determining whether the time series has any missing data values;

if any data values are missing, imputing at least one of the missing values into the time series;

determining whether the separate data values and any imputed data values of the time series are positive numbers;

if the data values are all positive, determining if logarithmic or square root transformation is needed;

if transformation is needed, transforming the time series comprised of positive separate data values and any positive imputed values;

determining the differencing order for the time series;

determining the non-seasonal AR and MA orders;

constructing an initial ARIMA model for the time series based on the differencing order and the AR and MA orders determined earlier; and

modifying the initial ARIMA model based on iterative model estimation results, diagnostic checking and ACF/PACF of residuals.

2. (Currently Amended) The method of claim 1 [[where]] wherein transforming the time series is comprised of a variance stabilizing transformation.

3. (Original) The method of claim 1 wherein transforming the time series is comprised of a level stabilizing transformation.

4. (Original) The method of claim 1 wherein transforming the time series is comprised of a variance stabilizing transformation and a level stabilizing transformation.

5. (Original) The method of claim 1 wherein determining the non-seasonal AR and MA orders is comprised of utilizing ACF, PACF, and EACF.

6. (Original) The method for determining the most optimum univariate model between the optimum exponential smoothing model and the optimum ARIMA model comprising:

calculating an NBIC value for each of the optimum exponential smoothing model and the ARIMA model; and

selecting, as the most optimum univariate model, one of the optimum exponential smoothing model and the ARIMA model; said selected model having the smallest NBIC.

7. (Original) The method of claim 6 further comprising calculating a revised NBIC value that makes the exponential smoothing and the univariate ARIMA models comparable by eliminating effects attributable to transformation and differencing.

8. (Original) A method for determining the order of a multivariate ARIMA model of a time series utilizing a computer comprising:

inputting the time series into the computer;

inputting the seasonal length for the time series into the computer;

inputting at least one category consisting of predictors, interventions and events represented by numerical values into the computer;

determining the univariate ARIMA order for the time series inputted into the computer;

determining whether the input of the categories has one or more missing values;

discarding the categories having any missing values;

transforming the positive inputted categories using the same transformation applied on the time series inputted;

differencing the inputted category using the same differencing orders applied on the time series inputted;

differencing further some inputted categories if necessary;

constructing an initial ARIMA model for the time series based on the univariate ARIMA found for the time series, the interventions and events, and the remaining predictors; and

modifying the initial ARIMA model based on iterative model estimation results, diagnostic checking and ACF/PACF of residuals.

9. (Original) The method of claim 8 where transforming the time series is comprised of a variance stabilizing transformation.

10. (Original) The method of claim 8 wherein transforming the time series is comprised of a level stabilizing transformation.

11. (Original) The method of claim 8 wherein transforming the time series is comprised of a variance stabilizing transformation and a level stabilizing transformation.

12. (Original) The method of claim 8 wherein the step of differencing further the inputted category comprises:

(a) for each said predictor, calculating the cross correlation function (CCF) between the already differenced predictor and the differenced time series inputted; and

(b) finding the further differencing order and differencing further the category where those predictors have CCFs that are insignificant.

13. (Currently Amended) The method of claim 8 further comprising:

(a) prior to constructing the initial model, eliminating any predictors with insignificant [[CCF's]] <u>CCFs</u> between the properly differenced predictor and the properly differenced time series inputted; and

(b) after constructing the initial model, eliminating the predictor with all insignificant estimated coefficients wherein said predictor is eliminated one at a time after each model estimation.

14. (Original) The method of claim 8 wherein the step of constructing an initial model comprises assigning an initial ARMA model with AR and MA orders found for the time series inputted to disturbance series.

15. (Original) The method of claim 8 further comprising changing the transfer function of some predictors into a rational form with a nonempty denominator.

16. (Original) A data processing system for determining the order of a univariate ARIMA model of a time series comprising:

a computer processor;

a memory responsively coupled to said computer processor containing:

(a) a set of computer instructions for accepting data input into the memory of the time series comprised of separate data values;

(b) a set of computer instructions for accepting the input of seasonal data into a memory of the time series;

(c) a set of computer instructions for determining whether the time series has any missing data values;

(d) a set of computer instructions for imputing at least one of the missing values into the time series;

(e) a set of computer instructions for determining whether the separate data values and any imputed data values of the time series are positive numbers;

(f) a set of computer instructions for transforming the time series comprised of positive separate data values and any positive imputed values;

(g) a set of computer instructions for determining the differencing order for the time series;

(h) a set of computer instructions for constructing an initial ARIMA model for the time series based on the differencing order and the AR and MA orders determined earlier; and

(i) a set of computer instructions for modifying the initial ARIMA model based on iterative model estimation results, diagnostic checking and ACF/PACF of residuals.

17. (Original) The data processing system of claim 16 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a variance stabilizing transformation.

18. (Original) The data processing system of claim 16 wherein the set of computer instructions for transforming the time series includes instructions for performing a level stabilizing transformation.

19. (Original) The data processing system of claim 16 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a variance stabilizing transformation and a level stabilizing transformation.

20. (Original) A non-volatile storage medium containing computer software encoded in machine readable format for determining the order of a univariate ARIMA model of a time series comprising:

(a) a set of computer instructions for accepting data input into the memory of the time series comprised of separate data values;

(b) a set of computer instructions for accepting the input of seasonal data into a memory of the time series;

(c) a set of computer instructions for determining whether the time series has any missing data values;

(d) a set of computer instructions for imputing at least one of the missing values into the time series;

(e) a set of computer instructions for determining whether the separate data values and any imputed data values of the time series are positive numbers;

(f) a set of computer instructions for transforming the time series comprised of positive separate data values and any positive imputed values;

(g) a set of computer instructions for determining the differencing order for the time series;

(h) a set of computer instructions for constructing an initial ARIMA model for the time series based on the differencing order and the AR and MA orders determined earlier; and

(i) a set of computer instructions for modifying the initial ARIMA model based on iterative model estimation results, diagnostic checking and ACF/PACF of residuals.

21. (Original) The non-volatile storage medium of claim 20 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a variance stabilizing transformation.

22. (Original) The non-volatile storage medium of claim 20 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a level stabilizing transformation.

23. (Original) The non-volatile storage medium of claim 20 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a variance stabilizing transformation and a level stabilizing transformation.

24. (Original) A data processing system for determining the order of a multivariate ARIMA model of a time series comprising:

a computer processor;

a memory responsively coupled to said computer processor containing:

(a) a set of computer instructions for accepting data input into the memory of the time series comprised of separate data values;

(b) a set of computer instructions for accepting the input of seasonal data for the time series;

(c) a set of computer instructions for accepting at least one category consisting of predictors, interventions and events represented by numerical values;

(d) a set of computer instructions for determining a univariate ARIMA model for the time series inputted into the computer;

(e) a set of computer instructions for determining whether the input of the categories has one or more missing values;

(f) a set of computer instructions for discarding the categories having any missing values;

(g) a set of computer instructions for transforming the inputted categories;

(h) a set of computer instructions for determining the differencing order for at least one of the inputted categories;

(i) a set of computer instructions for constructing an initial multivariate ARIMA model for the time series based on the differencing order and the AR and MA orders determined earlier; and

(j) a set of computer instructions for modifying the initial multivariate ARIMA model based on iterative model estimation results, diagnostic checking and ACF/PACF of residuals.

25. (Original) The data processing system of claim 24 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a variance stabilizing transformation.

26. (Original) The data processing system of claim 24 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a level stabilizing transformation.

27. (Original) The data processing system of claim 24 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a variance stabilizing transformation and a level stabilizing transformation.

28. (Original) A non-volatile storage medium containing computer software encoded in machine readable format for determining the order of a multivariate ARIMA model of a time series utilizing a computer comprising:

(a) a set of computer instructions for accepting data input into the memory of the time series comprised of separate data values;

(b) a set of computer instructions for accepting the input of seasonal data for the time series;

(c) a set of computer instructions for accepting at least one category consisting of predictors, interventions and events represented by numerical values;

(d) a set of computer instructions for determining a univariate ARIMA model for the time series inputted into the computer;

(e) a set of computer instructions for determining whether the input of the categories has one or more missing values;

(f) a set of computer instructions for discarding the categories having any missing values;

(g) a set of computer instructions for transforming the inputted categories;

(h) a set of computer instructions for determining the differencing order for at least one of the inputted categories;

(i) a set of computer instructions for constructing an initial multivariate ARIMA model for the time series based on the differencing order and the AR and MA orders determined earlier; and

(j) a set of computer instructions for modifying the initial multivariate ARIMA model based on iterative model estimation results, diagnostic checking and ACF/PACF of residuals.

29. (Original) The non-volatile storage medium of claim 28 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a variance stabilizing transformation.

30. (Original) The non-volatile storage medium of claim 28 wherein the set of computer instructions for transforming the time series includes computer instructions for performing a level stabilizing transformation.

31. (Original) The non-volatile storage medium of claim 28 wherein the set of computer instructions for transforming the time series includes computer instructions

for performing a variance stabilizing transformation and a level stabilizing transformation.

32. (Previously Presented) A method for creating a univariate ARIMA model of a time series utilizing a computer wherein separate data values, seasonal cycle and seasonal length for the time series are inputted into said computer comprising:

imputing at least one missing data value when any data values are missing from the time series;
transforming the time series when the time series comprises only positive data values;
determining the differencing order for the time series;
constructing an initial ARIMA model for the time series by determining non-seasonal AR and MA orders; and
modifying the initial ARIMA model.

33. (Previously Presented) The method of claim 32 wherein said imputing further comprises determining the presence of a seasonal pattern in the time series.

34. (Previously Presented) A method for creating a multivariate ARIMA model of a time series utilizing a computer wherein separate data values, the seasonal cycle and the seasonal length for the time series are inputted into said computer comprising:

a) inputting at least one category consisting of predictors, interventions and events represented by data values into the computer;
b) determining the univariate ARIMA order for the time series;
c) discarding predictors having at least one missing value;
d) transforming the predictor if the time series in b) is transformed and said predictor comprises only positive data values;
e) differencing said predictor, intervention and event if the times series in b) is differenced;

f) constructing an initial ARIMA model for the time series based on the univariate ARIMA found for the time series, the intervention and event, and the remaining predictor; and

g) modifying the initial ARIMA model.

35. (Previously Presented) The method of claim 34 wherein said determining the univariate ARIMA model further comprises imputing at least one missing data value when any data values are missing from the time series, transforming the time series when the time series comprises only positive data values; determining the differencing order of the time series and determining the orders for AR and MA.

36. (Previously Presented) The method of claim 35 wherein said transforming the time series further comprises fitting a high order AR(p) model by the ordinary least squares method on the time series, the log of the time series and the square root of the time series.